

Amendments to the Drawings:

Please replace existing Fig. 7 with amended Fig. 7 submitted herewith on a Replacement Sheet.

Fig. 7 has been amended to illustrate that a plurality of input port fibers may be used. No new matter has been added.

REMARKS

The Office Action of October 5, 2005 has been received and its contents reviewed. By the present amendment, claim 2 and Fig. 7 have been amended. Applicant submits that no new matter has been added by the foregoing amendments. Accordingly, claims 1-16 remain pending in this application. In view of these actions and the following remarks, reconsideration of this application is now requested.

Referring now to the Office Action, the Office has objected to the drawings under 37 C.F.R. § 1.83(a) as failing to show every feature of the invention specified in the claims. In particular, the Office asserts that none of the figures show “a cross-connect switch which includes a plurality of input port fibers”, “a MEMS cross-connect switch, comprising a plurality of input port fibers”, and “a pair of orthogonal single-axis mirror actuators.”

While the prior version of Figure 7 illustrated only a single exemplary input port fiber for clarity and simplicity, and the Applicants believe that the prior version of Figure 7 when combined with the related discussions in the Specification clearly provided a person of ordinary skill in the art with the understanding that a plurality of input port fibers could be used with the invention, Applicants submit herewith an amended Figure 7 that specifically illustrates that a plurality of input port fibers may be used to further the prosecution of the application. No new matter has been introduced by this amendment to Figure 7, and the amendment to Figure 7 is in no way intended to narrow the scope of the invention. As the claimed feature of “a plurality of input port fibers” is now clearly shown in the figures, Applicants respectfully request that this objection be withdrawn.

With respect to the claimed feature of “a pair of orthogonal single-axis mirror actuators”, Applicants respectfully submit that a corrected drawing sheet illustrating this feature is not required under 37 C.F.R. § 1.83(a). As the Examiner is aware, 37 C.F.R. § 1.81 provides that drawings are required *where necessary for the understanding of the subject*

matter sought to be patented. See also M.P.E.P. § 608.02. Applicants respectfully submit that a person of ordinary skill in the art would clearly understand an embodiment of the invention that utilizes a pair of orthogonal single-axis mirror actuators based on the disclosures in the Specification, for example, on page 6, lines 6-12, and the illustrations in the existing figures, for example, Figure 7. Therefore, Applicants do not believe it is necessary to submit any additional illustrations in this regard, and respectfully request that this objection be withdrawn.

In addition, claims 8 and 15 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. Specifically, the Office asserts that the claimed limitation of “a pair of orthogonal single axis mirror actuators” is not enabled by the Specification. However, as described above, Applicants respectfully submit that an embodiment of the invention that utilizes a pair of orthogonal single-axis mirror actuators would clearly be enabled based on the disclosures in the Specification, for example, on page 6, lines 6-12, and the illustrations in the existing figures, for example, Figure 7. Accordingly, Applicants respectfully request that this rejection be withdrawn.

Furthermore, claims 2, and 15-16 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Specifically, the Office asserts that the limitation “the re-configurable wavelength drop” lacks antecedent basis. However, claim 2 has been amended to recite a “re-configurable wavelength selective device”, which clearly has sufficient antecedent basis. In addition, Applicants submit that this amendment does not alter the scope of claim 2 in any way, and respectfully direct the Office’s attention to page 4, lines 21-23 of the Specification, which states that the term “re-configurable wavelength selective device” may also be referred to as a “re-configurable wavelength drop device”. Accordingly, Applicants respectfully request that this rejection be withdrawn.

In addition, claims 1, and 3-6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over US Patent No. 6,035,080 to Henry et al. in view of Figs. 4A and 4B, and lines 8-27 on page 3 of the Specification. Moreover, claim 7 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Henry in view of admitted prior art figs. 4A and 4B and lines 8-27 on page 3 (APA) and further in view of US Patent No. 5,446,809 to Fritz et al. Furthermore, claim 8 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Henry in view of admitted prior art figs. 4A and 4B and lines 8-27 on page 3 (APA) and further in view of US Patent No. 6,097,859 to Solgaard et al. However, as acknowledged by the Office, Henry fails to disclose:

1. A re-configurable wavelength selective device comprising:
an input fiber, where a signal comprising multiple wavelengths $\lambda_1, \lambda_2, \dots, \lambda_n$ is brought into the device,
a cross-connect switch which includes a plurality of input port fibers and an array of micro-mirror actuators; and
two output fibers, one for a selected wavelength λ_i and the other for the remaining wavelengths $\lambda_1, \lambda_2, \dots, \lambda_{i-1}, \lambda_{i+1}, \dots, \lambda_n$ which pass through the device unaffected.

Instead, Fig. 6 of Henry merely illustrates a system wherein a pair of $1 \times N$ optical switches are used to select between N ADFS. (Col. 5, lines 46-47). There is no suggestion whatsoever in Henry to use a cross-connect switch having a plurality of input port fibers and an array of micro-mirror actuators, as is recited in the claims.

Furthermore, contrary to the Office's implication, the Specification does not disclose that MEMS devices have been used in the prior art as wavelength selective switches. To the contrary, lines 18-19 on page 3 of the Specification provide that "MEMS devices have been used in the prior art in combination with other devices as wavelength selective switches," which is clearly distinct from the conclusions drawn by the Office. For example, the Specification provides an example wherein a micro-mirror array is combined with a free space bulk grating spectrograph to effect wavelength selection. There is no admission whatsoever in

the Specification that MEMS devices have been used as wavelength selective switches.

Based on the combined disclosures of Henry and the portions of the Specification relied upon by the Office, it would not have been obvious to a person of ordinary skill in the art to create a re-configurable wavelength selective device comprising an input fiber, where a signal comprising multiple wavelengths $\lambda_1, \lambda_2, \dots, \lambda_n$ is brought into the device, a cross-connect switch which includes a plurality of input port fibers and an array of micro-mirror actuators, and two output fibers, one for a selected wavelength λ_i and the other for the remaining wavelengths $\lambda_1, \lambda_2, \dots, \lambda_{i-1}, \lambda_{i+1}, \dots, \lambda_n$ which pass through the device unaffected, as recited in claim 1. Dependent claims 3-8 are allowable by virtue of their dependency on claim 1, and also on their own merits. Accordingly, Applicants respectfully request that this rejection under 35 U.S.C. § 103(a) be withdrawn.

Claims 9-14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over US Patent 6,768,822 to Robinson et al. in view of Figs. 4A and 4B, and lines 8-27 in page 3 of the Specification. However, as acknowledged by the Office, Robinson fails to disclose:

9. A reconfigurable dispersion compensation device, comprising:
an input fiber including a corrupted signal; and
a cross-connect switch that receives the corrupted signal and directs the corrupted signal to one of a plurality dispersion compensation gratings for imparting a compensating dispersion to the corrupted signal, the cross connect switch further comprising an array of micro-mirror actuators and an output for providing a compensated signal.

Instead, Robinson merely relates to chromatic dispersion device. There does not appear to be any suggestion in Robinson that the input signal may include a corrupted signal. In addition, there is no suggestion whatsoever in Robinson to use a cross-connect switch comprising an array of micro-mirror actuators, as is recited in the claims.

Furthermore, Applicants disagree with the Examiner's contention that a cross-connect switch comprising an array of micro-mirror actuators is well known in the art. To the contrary, while lines 8-9 of the Specification provides that "actuated micro-mirrors offer an inexpensive,

versatile way to redirect light beams in optical systems, lines 13-14 on page 3 provide that micro-mirrors may be formed into arrays, and lines 18-19 on page 3 provide that “MEMS devices have been used in the prior art in combination with other devices as wavelength selective switches,” there is no suggestion whatsoever in the Specification that a cross-connect switch comprising an array of micro-mirror actuators was known in the art prior to the invention by Applicants.

Based on the combined disclosures of Robinson and the portions of the Specification relied upon by the Office, it would not have been obvious to a person of ordinary skill in the art to create a reconfigurable dispersion compensation device, comprising an input fiber including a corrupted signal, and a cross-connect switch that receives the corrupted signal and directs the corrupted signal to one of a plurality dispersion compensation gratings for imparting a compensating dispersion to the corrupted signal, the cross connect switch further comprising an array of micro-mirror actuators and an output for providing a compensated signal, as recited in claim 9. Claims 10-14 are also allowable be virtue of their dependency on claim 2 and also on their own merits. Accordingly, Applicants respectfully request that this rejection under 35 U.S.C. § 103(a) be withdrawn.

Claims 2 and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Henry in view of US Patent No. 6,445,841 to Gloeckner et al. in view of Fritz. In addition, claim 15 stands rejected under 35 U.S.C. § 103(a) in view of Henry in view of Gloeckner, Fritz, and Figs. 4A and 4B and lines 8-27 on page 3 (APA) and further in view of Solgaard. In addition, claim 15 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Henry in view of Gloeckner, Fritz, and Figs. 4A and 4B and lines 8-27 on page 3 (APA) and further in view of Solgaard. However, Henry, Gloeckner, and Fritz, taken alone or in combination, fail to disclose:

2. A re-configurable wavelength selective device comprising:
 - a MEMS cross-connect switch, comprising a plurality of input port fibers, at least one array of micro-mirror actuators, and an array of output fibers, said cross-connect switch configured so that an optical signal received from any one of the input fibers may be directed to any one of the output fibers via the micro-mirror array;
 - an optical circulator having a first port, a second port and a third port, wherein light entering the first port exits the second port, light entering the second port exits the third port, and light entering the third port exits the first port;
 - a fiber optic coupler configured to combine all of the cross-connect switch output branches so that unselected wavelength channels exit the re-configurable wavelength selective device through a single fiber port; and
 - a plurality of fiber Bragg gratings (FBGs) configured to provide narrow band 20 spectral filtering by retro-reflecting the Bragg wavelength.

In particular, contrary to the Office's contention, Applicants submit that none of Henry, Gloeckner, or Fritz disclose or suggest a MEMS cross-connect switch comprising at least one array of micro-mirror actuators, as is recited in claim 2. Instead, Gloeckner discloses, in Figs. 9A and 9B, and in Col. 10, lines 44-61, an optomechanical matrix switch architecture that includes an *array of optomechanical switching cells 930*, which is arranged on the substrate 920, and a series of output fibers 940 are also connected to the substrate 920. There does not appear to be any suggestion of a MEMS cross-connect switch comprising at least one array of micro-mirror actuators as is required by the claims.

Based on the combined disclosures of Henry, Gloeckner, and Fritz, it would not have been obvious to a person of ordinary skill in the art to create a re-configurable wavelength selective device comprising a MEMS cross-connect switch, comprising a plurality of input port fibers, at least one array of micro-mirror actuators, and an array of output fibers, said cross-connect switch configured so that an optical signal received from any one of the input fibers may be directed to any one of the output fibers via the micro-mirror array, an optical circulator having a first port, a second port and a third port, wherein light entering the first port exits the second port, light entering the second port exits the third port, and light entering the third port exits the first port, a fiber optic coupler configured to combine all of the cross-connect switch output branches so that unselected wavelength channels exit the

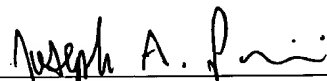
re-configurable wavelength selective device through a single fiber port, and a plurality of fiber Bragg gratings (FBGs) configured to provide narrow band 20 spectral filtering by retro-reflecting the Bragg wavelength, as is recited in claim 2. Claims 15 and 16 are also allowable be virtue of their dependency on claim 2 and also on their own merits. Accordingly, Applicants respectfully request that this rejection under 35 U.S.C. § 103(a) be withdrawn.

While the present application is now believed to be in condition for allowance, should the Examiner find some issue to remain unresolved, or should any new issues arise, which could be eliminated through discussions with Applicants' representative, then the Examiner is invited to contact the undersigned by telephone in order that the further prosecution of this application can thereby be expedited.

Respectfully submitted,

NIXON PEABODY, LLP

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Joseph A. Parisi
Registration No. 53,435

Nixon Peabody LLP
401 9th Street N.W., Suite 900
Washington, D. C. 20004
(202) 585-8000